Appl. No. 10/019,882
Amdt. Dated July 2, 2007
Reply to Office Action of April 20, 2007

REMARKS/ARGUMENTS

Claims 1-30 are pending in the present application.

This Amendment is in response to the Office Action mailed April 20, 2006. In the Office Action, the Examiner rejected claims 1-30 under 35 U.S.C. §101; claims 1-3, 7-11, and 15 under 35 U.S.C. §102(e); and claims 5, 13, 16-18, 20, 22-26, 28, and 30 under 35 U.S.C. §103(a). In addition, the Examiner indicated allowable subject matter for claims 4, 6, 12, 14, 19, 21, 27, and 29 if they are rewritten in independent form including all of the limitations of the base claim and any intervening claims. Reconsideration in light of the remarks made herein is respectfully requested.

Rejection Under 35 U.S.C. § 101

In the Office Action, the Examiner rejected claims 1-30 under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Applicant respectfully disagrees for the following reasons.

1. <u>Claims 1, 8, 16, and 23: Tangible result.</u>

Specifically, the Examiner contends that the claimed invention must produce a useful, concrete, and tangible result. The Examiner further contends that "the final result of Claims 1, 8, 16, and 23 only refer to an abstract speaker dependent model and not the actual tangible result of applying a speaker dependent model to a recognition mode" (Office Action, pages 2-3, paragraph number 3). Applicant respectfully disagrees.

Applicant refers to the "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" published in the Official Gazette, dated November 22, 2005 ("Guidelines").

The Guidelines states: To satisfy section 101 requirements, the claim must be for a practical application of the § 101 judicial exception, which can be identified in various ways: (1) The claimed invention "transforms" an article or physical object to a different state or thing; (2) The claimed invention otherwise produces a useful, concrete and tangible result, based on the factors discussed below. Applicant submits that the claimed invention transforms an article or physical object to a different state or thing, or alternatively, produces a useful, concrete, and tangible result.

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a) <u>Physical transformation:</u>

Claim 1 recites, among other things, (a) calculating estimated weights for identified errors in recognition of utterances based on a reference string; (b) marking sections of the utterances as being misrecognized and associating the estimated weights with the sections of the utterances; and (c) using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model.

All the elements in the claim are physical items or articles. The estimated weights are values. The utterances are spoken words or speech patterns. The reference string is a string of words that the speaker is requested to read. A speaker independent (SI) or a speaker dependent (SD) model is a framework or environment created to capture the physical characteristics of a given speaker. All of these are physical articles appearing in various forms, including data stored in computer storage medium. Converting a SI model to a SD model therefore transforms a framework of computations from a SI framework to a SD framework. This transformation is physical in that it converts the computations using the SI parameters into those using the SD parameters.

In addition, utterances and reference string are physical entities. Calculating estimated weights for identified errors in recognition of utterances based on a reference string is a physical transformation that calculates the estimated weights for identified errors in the recognition of the utterances.

Furthermore, marking sections of the utterances as being misrecognized is also another physical transformation that transforms sections of the utterances into sections labeled as being misrecognized. Moreover, associating the estimated weights with the sections of the utterances transforms the estimated weights into ones that are associated with the sections of the utterances.

Since all operations (calculating estimated weights for identified errors, marking sections of the utterances, associating the estimated weights, and converting a SI model to a SD model) represent physical transformations of physical entities (utterances) or reduction of the utterances to a different state or thing, the claimed invention satisfy the physical transformation requirement. Thus, the claimed invention is statutory.

b) <u>Useful, concrete, and tangible result:</u>

In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result achieved by the claimed invention is "useful, tangible and concrete." (Guidelines, page 20). Here, the final result of the claimed invention is converting a SI model to a SD model. The converted SD model is useful, tangible, and concrete.

Useful: For an invention to be "useful" it must satisfy the utility requirement of section 101. The USPTO's official interpretation of the utility requirement provides that the utility of an invention has to be (i) specific, (ii) substantial and (iii) credible. MPEP § 2107 and Fisher, 421 F.3d, 76 USPQ2d at 1230. Here, the utility of the claimed invention is specific, substantial, and credible. It is specific because it aims at speaker adaptation as a part of a speech recognition system. It is substantial because it attempts to solve a significant problem in signal processing, the speech recognition problem. It is credible because it provides a novel technique using methods that can be verified and confirmed by persons skilled in the art, such as SI or SD model, calculating weights, marking sections, and using the estimated weights..

Tangible: The tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. In other words, the opposite meaning of "tangible" is "abstract." Here, the claimed invention produces a real-world result because speaker adaptation is important in speech recognition. It does not represent an abstract idea such as democracy, freedom, or capitalism.

Concrete: The "concrete" requirement means that the process must have a result that can be substantially repeatable or the process must substantially produce the same result again. The opposite of "concrete" is unrepeatable or unpredictable. Here, the claimed invention is substantially repeatable and predictable. As long as there are utterances and a reference string, the claimed invention would produce the same result again.

2. Claims 1, 8, 16 and 23: Data structure.

The Examiner rejected claims 16 and 23 because they are drawn to "instructions" per se, stored on a storage medium (Office Action, page 3, lines 5-7). The Examiner further contends that data structures not claimed as embodied in computer readable media are descriptive material per se and not statutory because they are not capable of causing functional change in the

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computer (Office Action, page 3, lines 8-10). Applicant respectfully disagrees for the following reasons.

Claims 16 and 23 essentially recite the same operations as in claim 1. As discussed above, the claimed invention is statutory because the claimed invention "transforms" an article or physical object to a different state or thing; or otherwise produces a useful, concrete and tangible result. Claims 16 and 23 do not recite merely data structures embodied on a storage medium like an image file stored on a CD, or a movie stored on a DVD. Such an image file or a movie is the non-functional descriptive material that may be non-statutory. In contrast, claims 16 and 23 recite specific operations that are performed by a machine or a computer to bring about the physical transformations on physical entities.

Claims 16 and 23, recite, among other things, operations performed by a computer including calculating estimated weights for identified errors in recognition of utterances based on a reference string, marking sections of the utterances as being misrecognized and associating the estimated weights with the sections of the utterances, and using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model. These are not data structures. They represent specific acts, operations, or actions which bring about functional changes on physical articles or items.

In summary, the claimed invention satisfy all the statutory requirements under 35 U.S.C. § 101 as provided by the Guidelines.

Rejection Under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1-3, 7-11, and 15 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,272,462 issued to Nguyen et al. ("Nguyen"). Applicant respectfully traverses the rejection and submits that the Examiner has not met the burden of establishing a prima facie case of anticipation.

Nguyen discloses a supervised adaptation using corrective N-best decoding. A recognizer is designed to select the best solution, that is, the model that best corresponds to the input utterance (Nguyen, col. 2, lines 56-58). In this application the recognizer supplies the N-best solutions 14, that is, a predetermined fixed plural number of solutions or, alternatively, a

plural number of solutions that had a recognition score greater than a predetermined threshold (Nguyen, col. 2, lines 58-62).

Nguyen does not disclose, either expressly or inherently, at least one of: (1) calculating estimated weights for identified errors in recognition of utterances based on a reference string; (2) marking sections of the utterances as being misrecognized and associating the estimated weights with the sections of the utterances; and (3) using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model.

First, Nguyen merely discloses N-best solutions (Nguyen, col. 2, lines 58-62), not utterances. A best solution is a model that best corresponds to the input utterance (Nguyen, col. 2, lines 56-58). A best solution, therefore, is not an utterance, but merely a model that best corresponds to the utterance.

Second, Nguyen merely discloses applying the weights to the N-best solutions (Nguyen, col. 3, lines 47-48), not marking sections of the utterances as being misrecognized, and not associating the estimated weights with the sections of the utterances. The weights are applied to "push models that generate incorrect labels away from those that generate correct ones." (Nguyen, col. 3, lines 39-41). Since the weights are applied only to the N-best solutions, no sections of the utterances are marked. Furthermore, since no sections are marked, there cannot be associating the estimated weights to the sections.

Third, Nguyen merely discloses once weights are applied to the N-best solutions, the weighted information is then used by the model adaptation module 18 to selectively adapt the speech models 12 (Nguyen, col. 3, lines 47-50), not using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model. The models 12 are speaker-independent model (Nguyen, col. 2, lines 48-49). Accordingly, there is no conversion of SI model to SD model.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Vergegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ 2d 1913, 1920 (Fed. Cir. 1989). Since the Examiner failed to

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show that Nguyen teaches or discloses any one of the above elements, the rejection under 35
U.S.C. §102 is improper.

Therefore, Applicants believe that independent claims 1, 8, 16, and 23, and their
respective dependent claims are distinguishable over the cited prior art references. Accordingly,
Applicants respectfully request the rejection under 35 U.S.C. §102(e) be withdrawn.

Rejection Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 5, 13, 16-18, 20, 22-26, 28, and 30
under 35 U.S.C. §103(a) as being unpatentable over Nguyen in view of U.S. Patent No.
6,253,181 issued to Junqua ("Junqua"). Applicant respectfully traverses the rejection and
submits that the Examiner has not met the burden of establishing a prima facie case of
obviousness.

The Supreme Court in *Graham v. John Deere*, 383 U.S. 1, 148 USPQ 459 (1966), stated:
"Under § 103, the scope and content of the prior art are to be determined; differences between
the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the
pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject
matter is determined." MPEP 2141. In *KSR International Co. vs. Teleflex, Inc.*, (No. 04-1350),
in a decision handed on April 30, 2007, the Court explained that "[o]ften, it will be necessary for
a court to look to interrelated teachings of multiple patents; the effects of demands known to the
design community or present in the marketplace; and the background knowledge possessed by a
person having ordinary skill in the art, all in order to determine whether there was an apparent
reason to combine the known elements in the fashion claimed by the patent at issue." (Slip Op.
at 14. *Emphasis added*.) The Court further required that an explicit analysis for this reason must
be made. In the instant case, Applicant respectfully submits that there are significant differences
between the cited references and the claimed invention and there is no apparent reason to
combine the known elements in the manner as claimed, and thus no *prima facie* case of
obviousness has been established.

Nguyen discloses a supervised adaptation using corrective N-best decoding as discussed
above.

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Junqua discloses a speech recognition and teaching apparatus able to rapidly adapt to difficult speech of children and foreign speakers. A likelihood score ratio compares the likelihood score associated with correct recognition with the mean or average of the likelihood scores associated with incorrect recognition (Junqua, col. 4, lines 18-24). The ratio uses the Hidden Markov Model (HMM) (Junqua, col. 5, lines 35-45).

Nguyen and Junqua, taken alone or in any combination, do not disclose or render obvious, at least one of: (1) calculating estimated weights for identified errors in recognition of utterances based on a reference string; (2) marking sections of the utterances as being misrecognized and associating the estimated weights with the sections of the utterances; (3) using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model; and (4) calculating the estimated weights comprises computing an average likelihood difference per frame according to equation as follows:

$$L_n = \frac{H_L^n}{H_e^n - H_b^n} - \frac{R_L^n}{R_e^n - R_b^n}$$ where H_L^n is a log likelihood of hypothesis word n, H_b^n is a

beginning frame index (in time), and H_e^n is an end frame index, and R_L^n, R_b^n and R_e^n are counter parts for the reference string, as recited in claims 5 and 13.

As discussed above in the §102 rejection, Nguyen does not disclose elements (1) - (3). Therefore, any combination of Nguyen with any other reference in rejecting claims 5, 13, 16-18, 20, 22-26, 28, and 30, is improper.

Furthermore, Junqua merely discloses the likelihood of observation given HMM model (Junqua, col. 5, lines 43-44), not an average likelihood difference per frame, or averaging the average likelihood difference over error words.

In addition, Junqua merely discloses a likelihood score ratio that compares the likelihood score associated with the mean or average of the likelihood scores associated with the incorrect recognition (Junqua, col. 4, lines 18-21). The likelihood ratio is the ratio between the likelihood score for correct recognition and the likelihood score for incorrect recognition (Junqua, col. 5, lines 26-30).. In contrast, claim 5 recites the average likelihood difference (not ratio) per frame.

The Examiner failed to establish the factual inquiries in the three-pronged test as required by the *Graham* factual inquiries. There are significant differences between the cited references

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and the claimed invention as discussed above. Furthermore, the Examiner has not made an explicit analysis on the apparent reason to combine the known elements in the fashion in the claimed invention. Among other things, Nguyen merely discloses: (1) N-best solutions, not utterances; (2) applying the weights to the N-best solutions, not marking sections of the utterances as being misrecognized, and not associating the estimated weights with the sections of the utterances; (3) the weighted information is used by the model adaptation module to selectively adapt the speech models, not using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model. Similarly, among other things, Junqua merely discloses: (1) the likelihood of observation given HMM model, not an average likelihood difference per frame, or averaging the average likelihood difference over error words; and (2) a likelihood score ratio that compares the likelihood score associated with the mean or average of the likelihood scores associated with the incorrect recognition, not the average likelihood difference per frame. Accordingly, there is no apparent reason to combine the teachings of Nguyen and Junqua.

In the present invention, the cited references do not expressly or implicitly suggest any of the above elements. In addition, the Examiner failed to present a convincing line of reasoning as to why a combination of Nguyen and Junqua is an obvious application of speaker adaptation using weighted feedback.

Therefore, Applicants believe that independent claims 1, 8, 16, and 23, and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicants respectfully request the rejection under 35 U.S.C. §103(a) be withdrawn.

Allowable Subject Matter

Applicants note with appreciation the Examiner's indication of allowable subject matter. The Examiner objects to claims 4, 6, 12, 14, 19, 21, 27, and 29 as being dependent on a rejected base claim, but indicates that the claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, in light of the above amendments and remarks, Applicants respectfully request that independent claims 1, 8, 16, and 23, and all claims that depend therefrom be allowed.

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Conclusion

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: July 2, 2007   By _____

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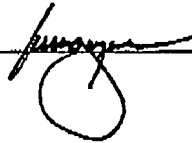| **MAILING**	**FACSIMILE**

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